

What is claimed is:

1. A process for isomerizing pentenenitrile in a reaction stream, wherein the isomerization takes place over at least one heterogeneous catalyst in a distillation column at least comprising a bottom zone, a reaction zone and a top zone, and, during the isomerization, the isomerization reactant is distillatively enriched in the reaction zone of the distillation column in relation to the isomerization product.
- 10 2. The process according to claim 1, wherein cis-2-pentenenitrile is isomerized to trans-3-pentenenitrile.
- 15 3. The process according to claim 2, wherein the trans-3-pentenenitrile is obtained in the bottom of the distillation column and the cis-2-pentenenitrile in the top of the distillation column.
- 20 4. The process according to any of claims 1 to 3, wherein the heterogeneous catalyst used is an oxide of main group or transition group 3 or 4 of the Periodic Table.
- 25 5. The process according to any of claims 1 to 4, wherein the heterogeneous catalyst is introduced into a structured packing which forms interstices in the column interior, the quotient of the hydraulic diameter for the gas stream through the structured packing or random packing and the equivalent diameter of the catalyst particles being from 2 to 20, so that the catalyst particles can be loosely inserted into the interstices under the action of gravity, distributed and discharged again if required, and the structured packing forms other interstices in which the quotient of the hydraulic diameter for the gas stream through the structured packing or the random packing and the equivalent diameter of the catalyst particles is less than 1, so that no catalyst particles can be inserted into the second subregions.
- 30 6. The process according to any of claims 1 to 5, wherein the isomerization is additionally carried out in the presence of a homogeneous catalyst.
- 35 7. The process according to claim 6, wherein the reaction is carried out in the presence of an ionic liquid as a homogeneous catalyst, the ionic liquid being selected from the group consisting of Brønsted acid adducts of organic nitrogen-containing substances.

8. The process according to claim 6, wherein the catalyst used is a C1- to C20-mono- or -diamine.
9. The process according to any of claims 1 to 8, wherein the reactant stream  
5 comprises further components selected from the group consisting of C5-mononitriles, C6-dinitriles, aliphatic C1- to C16-alkanes, cyclic C1- to C16-alkanes, aliphatic C1- to C16-alkenes, cyclic C1- to C16-alkenes.
10. The process according to any of claims 1 to 8, wherein the reactant stream stems  
10 from a process for hydrocyanating 3-pentenenitrile.
11. The process according to any of claim 1 to 10, wherein the temperature in the bottom zone of the distillation column is from 30°C to 300°C.